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sticks, &c. &c., said to have been found in the lake, have come from the lost city, is more than doubtful. It is more probable that, in the political tempests which have passed over these countries, some of the inhabitants may have committed their treasures for greater security to the waters of the lake, and may afterwards have perished without divulging the secret, or have been unable to find the deposit, until long after accident or avarice may have brought to light the hidden treasures.

XIV.—*On the Latitude and Longitude of some of the principal Places in the Republic of Guatemala.* By A. VAN DE GEHUCHTE.

Communicated by JOHN POWER, Esq., of Panama, F.R.G.S.

Read, June 14, 1858.

SIR,—After the first exploration made by me, in the interior of the Republic, I saw that all the maps of the country were bad; and after having examined many of them attentively, I came to the conclusion that they were not the result of measurement as they ought to be, but compilations made in offices, from a mass of false data, and from notes, each more incorrect than the other. From that moment I saw that the compilation of a good map would be very useful, as well in the country as abroad, and I resolved to undertake it, not being ignorant that such a work undertaken by a single person was very difficult, and required profound study of the localities; that this study involved many journeys, and, consequently, demanded considerable outlay. This was no obstacle to me, and after eight years of assiduous labour I find myself to-day in a position to form a correct map of the entire republic of Guatemala.

If I have not published this work, it is because I want to make some further explorations in the S.E. part of the coast, which up to the present time I have not been able to accomplish.

Until I can publish my map, I take the liberty of laying before you some notes which may be interesting, requesting you to publish them in your valuable Journal.

It became at once necessary, as a base of operation, to determine the true position of the city of Guatemala. This important point was surrounded with many difficulties, because some placed it in lat. $14^{\circ} 37'$, others in $14^{\circ} 35' 30''$; in fact, it had generally been placed in $14^{\circ} 36'$. Seventy-four astronomical observations made by day and night, with an excellent sextant, and with a perfect theodolite, gave me a mean of $14^{\circ} 37' 30''$.

Nevertheless, in view of so many contradictory opinions, it

became necessary to make sure that this latitude was the correct one; for this purpose it was requisite to establish a series of triangulations on the numerous volcanos of the republic. I commenced, therefore, by determining the true distances of the volcanos of Agua, of Fuego, and of Pacaya, with respect to Guatemala. I laid down carefully measured base lines near the city, and I found that the volcano of Pacaya was distant from the cathedral 31255 mètres; Agua, 32510 mètres; Fuego, 45010 mètres.

These points being once established, it became necessary to determine their distance from the shore of the Pacific. For this purpose I went many times to the old port of Iztapa, and measuring there a base of 11702 mètres, to the present port of San José de Guatemala, I found the distance from Iztapa to be—to volcano of Pacaya, 51800 mètres; of Agua, 60200 mètres; of Fuego, 64210 mètres; that Iztapa is south $15^{\circ} 20'$ west of Guatemala; and that the line between these two localities, or the hypotenuse of the triangle, is 82801 mètres.

I deduce from this that the latitude of Iztapa is $13^{\circ} 53' 53''$, counting the length of the degrees of the meridian with a compression of $\frac{1}{30864}$. The mean of more than 200 observations made by me and by various vessels has given the position as $13^{\circ} 53' 32''$ N. lat.; my calculations give $13^{\circ} 53' 53''$; a difference of very little importance.

All these triangulations have tended to confirm the correctness of my astronomical observations made in Guatemala, because, if the capital is in $14^{\circ} 36'$, Iztapa should be in $13^{\circ} 52' 03''$, a result which no observation has given: if, on the other hand, the latitude be taken at $13^{\circ} 56' 30''$, as some have asserted, Guatemala would be in $14^{\circ} 40' 07''$, in which no calculation has ever placed it. I deduce therefore from this, that the correct position of Guatemala is, undoubtedly, $14^{\circ} 37' 30''$ N.

The determination of the longitude was a little more difficult. The mean of a large number of calculations gave me $90^{\circ} 30' 37''$ W. of Greenwich: the position of my triangle at Iztapa, placed by the generality of calculators in $90^{\circ} 43'$, gave me for the capital, $90^{\circ} 30' 47''$, which I do not hesitate to accept as correct.

In the Gaceta of Guatemala, of 23rd of October, 1857 (sic), the Rev. Father Cornette has fixed the longitude of Guatemala in $92^{\circ} 24' 45''$ (meridian of Paris). I do not doubt that if the solar altitudes, which had served for the correction of the watch, had been calculated on the latitude of $14^{\circ} 37' 30''$, instead of $14^{\circ} 35' 30''$, the longitude given by the Rev. Father would slightly have differed from mine.

One single operation might have led me into error, but here I made three journeys (in 1852, 1854, and 1857) on foot, measur-

ing, with the chain, the whole Pacific coast from the mouth of the river Paz to Ocoz, the mouth of the river Tilapa, a distance of more than 60 leagues. I established on the sea-beaches a great system of triangulations between all the volcanos, taking at my fancy bases of 10000, 20000, 30000, and 40000 mètres; and these operations have agreed exactly with my astronomical observations.

The altitudes of the mountains, taken trigonometrically and carefully reduced, have agreed, with but slight exceptions, with my barometrical observations.

I had most difficulty in determining the position of Quezaltenango, owing to the clouds that usually envelop the "Altos" (high lands): nevertheless, my astronomical observations and the result obtained by triangulation agree perfectly well.

I do not give you a detailed statement of the hundreds of longitudes I have determined, nor of the thousands of triangles I have reduced; I confine myself to mention, at present, the latitude and longitude of the volcanos and of the capitals of the various departments.

					Longitude W. of Greenwich.			Latitude North.		
					°	'	"	°	'	"
Volcano of Agua	..	..	..	..	90	45	07	14	26	48
" Fuego	..	..	..	..	90	53	30	14	27	25
" Pacaya	..	..	..	..	90	36	34	14	21	30
" Atitlan	..	..	..	..	91	12	47	14	34	38
" Santa Maria	..	..	..	..	91	36	34	14	46	39
" Tajumulco	..	..	..	..	92	06	07	15	09	58
" Tacaná	..	..	..	..	92	15	17	15	24	11
Guatemala (city)	..	..	..	..	90	30	47	14	37	30
La Antigua	..	..	..	..	90	44	50	14	32	58
Amatitlan	..	..	..	..	90	37	50	14	28	39
Escuintla	..	..	..	..	90	47	48	14	16	46
Chimaltenango	..	..	..	..	90	49	30	14	38	49
Sololá	..	..	..	..	91	12	14	14	46	54
Totonicapam	..	..	..	..	91	21	45	14	58	18
Quezaltenango	..	..	..	..	91	34	20	14	51	32
Güegüetenango	..	..	..	..	91	36	50	15	28	15
Chiquimula	..	..	..	..	89	32	17	14	54	10
Mazatenango	..	..	..	..	91	33	14	14	40	42
Salamá	..	..	..	..	90	24	47	15	17	10
Flores, Laguna del Peten	..	..	..	..	90	04	52	17	09	47
Iztapa	..	..	..	..	90	43	0	13	53	53
Port of San José de Guatemala	..	..	..	..	90	49	27	13	53	19
Port of San Luis, bar of the river	..	..	..	..	91	51	29	14	09	07
Samalá	..	..	..	..		

With the map I will publish a statistical explanation, giving the position of all the points of the Republic, the direction and distance of the roads from one point to another, the origin of each city, its population and commerce, notices of the principal rivers, of the heights of the numerous volcanos of the Republic, a section

of the country from the Pacific to the North Sea (Atlantic), the difference of level between the two seas, a section of the Republic from E. to w., showing the height of all the hills and all the cities, towns, and villages, and much other information hitherto unpublished.

I am, Sir, your very obedient servant,

A. VAN DE GEHUCHTE, *Engineer.*

XV.—*On the Fine Regions of the Trade Winds.* By THOMAS HOPKINS, M.B.M.S., Vice-President of the Manchester Literary and Philosophical Society.

Read, June 14, 1858.

IT has been abundantly shown that there are certain elevated lands which form areas of condensation of aqueous vapour, and consequent atmospheric vacua, towards which winds, known as trade winds and monsoons, blow over wide oceans. These winds, as they approach the places of condensation, loaded with the vapour they have taken up from the water over which they have passed, become stronger, and are frequently boisterous and rainy. It has also been proved that towards these same areas other, which may be called collateral winds, that are dry, blow from cool to warm latitudes, over lands, making such lands arid in their general character, and constituting them dry countries.* The trade winds and monsoons have also been traced backwards, over the oceans, from the areas of condensation to the parts where the winds appear to take their rise, and where fine weather is generally found.

But as these fine parts over the ocean bear a certain resemblance to the arid countries that have been pointed out, it may be worth while to advert to them again, in order more fully to understand their peculiar character, ascertain their geographical distribution, and the kind of circumstances that are associated with their movements, including the sources from which the air is supplied.

Condensation in Australasia gives birth to the trade winds of the southern tropical Pacific Ocean; and near the Australasian islands the winds are of considerable strength, and occasionally stormy. But as has been before stated, more to the E., excepting during the summer monsoons of this ocean, the same winds are milder and steady, until at last, nearer to the American continent, they breathe only as gentle zephyrs. Opposite to the Island of Juan Fernandes, in say 32° of latitude and 90° of west longitude, until the equator is approached, a steady and mild trade wind is gene-

* See vols. xxvi. and xxvii. of the Journal of the Royal Geographical Society.